Certification and testing

Arteco ceiling products have been awarded an indoor climate certificate (No. 013) from the Danish Indoor Climate Labelling Standards Board. The measured indoor climate value achieved was 10 days and the emission of particles classified as low. The evaluation was based on tests on Gyptone POINT 11, BASE and QUATTRO tiles.

All BPB production plants throughout Europe involved in the manufacture of Arteco ceiling products operate a formal Environmental Policy and an Environmental Management System to BS EN ISO 14001. Quality Assurance standards are to BS EN ISO 9002.

Sources

The following sources of information were used:

1. Gyptone and Casoprano ceiling systems – Summary of investigation by means of the TWIN Environmental Classification Model. Reference 638.01.127/ra ©2001 Dutch Institute for Construction Biology and Ecology, NIBE Research bv.

2. Dansk Indeklima Maerkning (Danish Indoor Climate Labelling Standards Board) – Indoor Climate Certificate 013.

3. Environmental declaration for building materials, produced by Gyproc A/S, Hareskovvej 12, 4400 Kalundborg, Denmark.

ARTECO

CEILING PRODUCTS

Gyproc, Thistle, Gypframe, Glasroc and Arteco are all registered trade names of BPB UK Limited. Isover is a registered trade name of Saint-Gobain.

British Gypsum reserves the right to revise product specifications without notice. The information in this document was correct to the best of our knowledge at the time of publication. It is the user's responsibility to ensure that it remains current prior to use.

The information in this document is for guidance only and should not be read in isolation. Users should read and familiarise themselves with all the information contained in this document and ensure that they are fully conversant with the products and systems being used, before subsequent specification or installation.

For a comprehensive and up-to-date library of information visit the British Gypsum website at: www.british-gypsum.com

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Arteco ceiling products– significantly contributing to environmental sustainability

The context

Increasingly, specifiers are having to take into account whole-life building costs. Building in an environmentally and energy saving way is becoming a real issue, as is the physical well-being of the building occupiers. The rationale is simple - whole-life building costs can be significantly reduced by using products which are environmentally sustainable and which present minimal risk to health during their life cycle. This paper presents an overview of a detailed environmental and health study carried out in the Netherlands and critically compares British Gypsum Arteco Gyptone and Casoprano ceiling products with alternative generic products manufactured from glass wool and from powder coated steel.

Summary of Life Cycle Analysis study findings

The Dutch Institute for Construction Biology and Ecology has evaluated Arteco Gyptone and Casoprano products from an environmental perspective as Class 2b, designated 'Good choice', with scores of only 532 and 518 respectively.
The glass wool 'reference' is designated Class 1a, 'Best choice', with a score of 100. Steel ceiling tiles are designated Class 3c, 'Acceptable', with a score of 2260. See **Fig.1**

From a health perspective Arteco Gyptone and Casoprano products are designated '+', with no health risks identified during their life cycle. They achieved a superior rating compared with glass wool or steel. See **Fig. 2**

When selecting a product it is fundamental that both the environmental and health evaluations are taken into account. Both sets of data need to be assessed in relation to each other. In this way, when taking the study findings as a whole, Arteco ceiling products achieve the best overall performance.

Fig. 1 Environmental evaluation

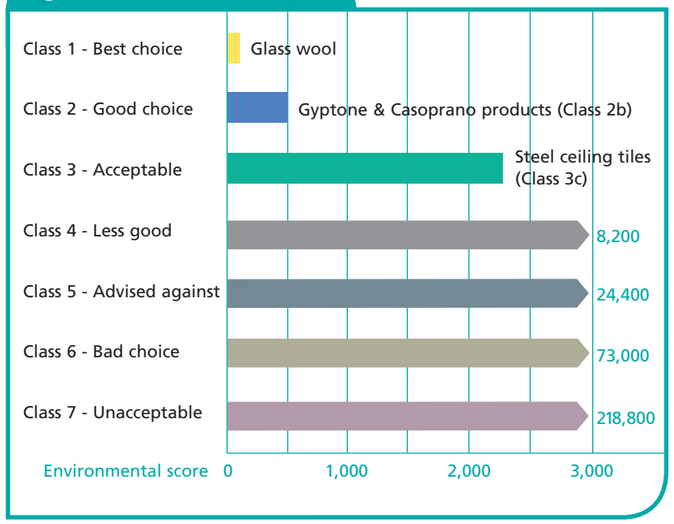
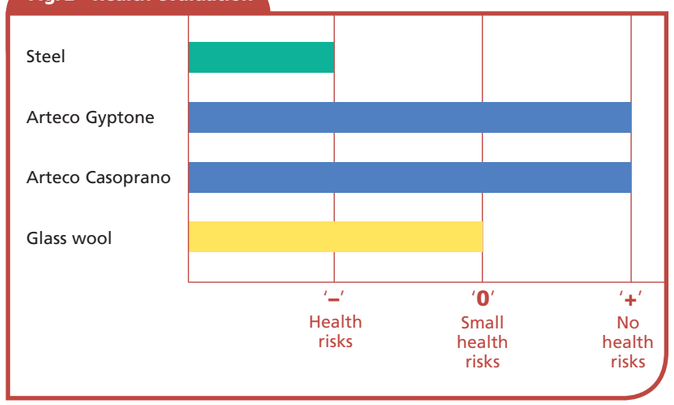


Fig. 2 Health evaluation



British Gypsum

The study

The analysis tool used in the study is the TWIN Environmental Classification Model. This was developed jointly by the Dutch Institute for Construction Biology and Ecology and the Technical University of Eindhoven. The model is based on the Life Cycle Analysis methodology conceived by the Centre of Environmental Science in Leiden, but it allows supplementary assessments where data is incomplete and more fully considers the impact on health. The evaluation is therefore more substantial and allows comparative conclusions to be drawn. It is then possible to achieve a measure of how one product compares with another. For the purposes of the study a 1m^2 area of suspended ceiling is considered, module size 600mm x 600mm in a 15mm visible profile, over a 50 year span.

The model is depicted graphically in **Fig. 3** Each of the main criteria listed is divided further into sub-criteria. 'Physical agents' for instance is divided into five sub-criteria – electro-magnetic fields, electro-static fields, static magnetic fields, radon and radio activity, and moisture regulation. In relation to the ceiling product systems evaluated in the study, steel tiles are likely to interfere with electro-magnetic fields, which has implications for certain types of installation. Glass wool tiles have a backing film which if damaged can lead to glass fibres entering the internal environment, **Arteco Gyptone and Casoprano products can absorb and release moisture and can therefore enhance internal conditions by regulating the moisture content.**

Health criteria are evaluated in a qualitative (subjective) manner by 'expert evaluation' and designated '+' = no health risks, '0' = small health risks, or '-' = health risks.

The evaluation of environmental criteria is more complex. The key steps are information gathering, measurement, comparative assessment against reference criteria, applying a weighting factor and aggregating individual scores. The overall environmental 'burden' is then classified on a scale of 1 to 7 – from 'best choice' through to 'unacceptable'.

Whilst in this case the study has been applied to compare the performance of building products, it should be noted that it can also be applied to specific constructions or to whole buildings.

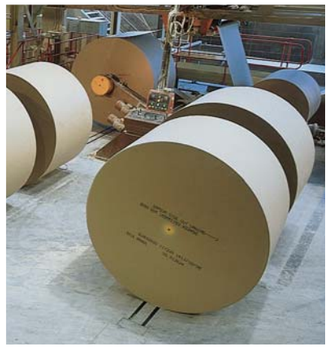
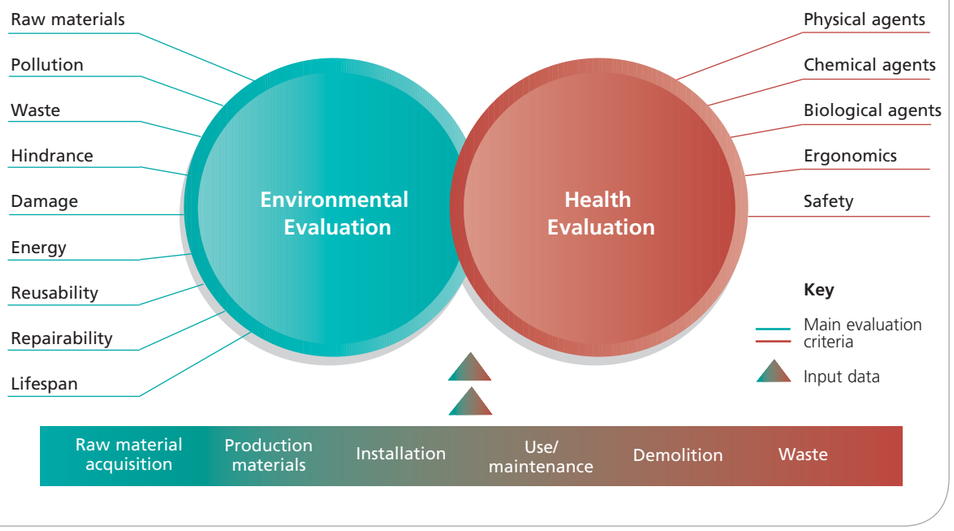


Fig. 3 Twin Environmental Classification Model



Gyptone and Casoprano products – critical evaluation of study findings

Gyptone and Casoprano products have a low measured environmental burden (classified as 'good choice') and favourable health evaluation ('+'). **Tables 1** and **2** summarise performance against the main evaluation criteria in the study.

Table 1 Environmental evaluation of Gyptone and Casoprano products

Main criteria	Overview of performance
Raw materials	Exhaustion not applicable
Pollution	Minimal contribution
Waste	Only 1-3% of total tile weight is generated as waste during acquisition of raw materials, transport, processing and tile production.
Hindrance	Only a small measured hindrance in respect of noise and accident risk.
Damage	Some damage to landscape and local disturbance of ecosystem during mineral extraction but most damage can be rectified over a 20 year cycle. Some 'pressure on public space' resulting from processing and production facilities.
Energy	77 – 85 MJ/m^2
Reusability	In practice re-use of tiles is limited. Plaster waste from process operations is used again in production. There is potential to re-process clean gypsum waste resulting from demolition although currently most is sent to landfill sites.
Repairability	Minimal maintenance. Tiles damaged during building occupation can be easily replaced
Lifespan	> 50 years.

Table 2 Health evaluation of Gyptone and Casoprano products

Main criteria	Overview of performance
Physical agents	Tiles themselves cause no disturbance of electro-magnetic or static magnetic fields. Classed as 'favourable' in respect of radon and radio activity (little radon released in practice due to low emanation factor of gypsum). Tiles can have a positive effect on the internal environment by regulating moisture conditions / humidity. Production / processing environment can be noisy, therefore ear protection is required. In use, tiles improve the internal environment by absorbing some of the sound energy.
Chemical agents	No damaging emissions during production. Some nuisance dust during sawing so good extraction equipment is required. No effects are known / expected resulting from biological agents, although mould / fungi can form if products are installed in continuously damp internal conditions.
Ergonomics	Production is largely automated and tiles themselves weigh only around 7kg/m^2, giving rise to no problems during lifting. Fixer / installer can experience usual complaints of fatigue and shoulder, neck and lower back problems.
Safety	Normal risk of accidents to fixer / installer apply. Plant safety precautions are exercised in the extraction and processing of gypsum mineral.

Gyptone and Casoprano products

F A C T F I L E

Composition

Products are manufactured from processed gypsum mineral which is 'sandwiched' between two paper liners. Additives include; foam agent, PVA glue, starch, sugar solution, setting time modifier and hot-melt adhesive.
To increase sound absorbtion, acoustic tissue is glued to the back of perforated tiles. Surface finish / treatment is either paper liner or a water based paint.

Main raw materials

***Paper liner** made from waste paper and board produced by production plants throughout Europe.*
***Gypsum mineral** either mined naturally and / or produced by cleaning flue gas emissions from power stations (DSG – desulphogypsum), supplemented by addition of waste gypsum. Mineral is heat treated and mechanically processed into hemi-hydrate plaster and made into a slurry for forming sheets.*

Installation

Straightforward installation into standard T15 and T24 ceiling grids, by others.

Maintenance

Ceiling tiles can be cleaned using a damp cloth or soft brush. Most standard mild detergents can be used. Tiles other than Gyprex can be re-decorated if required using a suitable emulsion paint.
Perforated tiles must not be spray painted or their sound absorption performance will be impaired.

Removal

Easily removable in the event of demolition / building change of use, etc. Re-use in-situ is possible if products are not damaged. Gypsum can be recycled.

Waste processing

Cutting / punching waste produced during tile manufacture is processed again into gypsum products.

Application

Used in suspended ceilings (and in some cases as a wall lining) to enhance the interior design and to provide acoustic performance. Perforated boards with an acoustic tissue backing reduce reverberation times and can be specified to achieve the correct acoustic climate in public areas including classrooms, lobbies, common rooms, shops and restaurants.